

## Determinants of Firm's Capital Structure in Indonesia's Construction Industry with Age and Firm Size as Control Variable

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### Abstract

This study examines the influence of profitability, growth, non-debt tax shield, and asset tangibility on capital structure, while controlling for firm age and size. A purposive sampling method was applied, covering 21 companies in the construction sector—including infrastructure, property, and real estate—listed on the Indonesia Stock Exchange from 2013 to 2022. The findings indicate that profitability and asset tangibility negatively affect capital structure, suggesting that firms with higher profitability and more tangible assets tend to employ lower leverage. In contrast, growth exhibits a positive relationship with capital structure, implying that expanding firms may use higher leverage to finance growth initiatives. The impact of non-debt tax shields on capital structure was found to be insignificant. Controlling for variations due to firm age and size further clarifies these relationships. The results provide valuable insights for financial management, enhancing understanding of the determinants of capital structure in Indonesian construction companies.

**Keywords:** *Capital Structure; Profitability; Growth; Non-debt Tax Shield; Asset Intangibility.*

### Introduction

In the intricate landscape of financial management, a company's capital structure is a critical determinant of its value, financial stability, and ability to meet obligations. As Chakrabarti (2000) asserts, capital structure is a double-edged sword: it provides essential funds for operations and expansion, but mismanagement can trigger financial turmoil or even bankruptcy. Achieving an optimal mix of debt and equity depends on multiple factors, necessitating a holistic approach to capital structure planning (Bates, 2018).

This imperative is particularly pronounced in Indonesia's construction industry, a key contributor to national economic growth. The sector accounted for 4% of GDP in 2019 (Statistics Indonesia, 2020), with infrastructure, property, and real estate playing pivotal roles. In 2021, the construction industry contributed 10.44% of GDP (IDR 1.77 quadrillion), including the real estate sector's IDR 468.22 trillion (2.76% of national GDP) (BPS, 2021). Large-scale infrastructure initiatives, such as the new capital city in East Kalimantan and the Jakarta–Bandung high-speed railway, further amplify the sector's growth potential. Fitch Solutions Country Risk & Industry Research projects 6.2% growth in 2021, following a 1.9% contraction in 2020 due to COVID-19.

However, growth is accompanied by challenges in capital structure management. Government policies, economic conditions, industry characteristics, and firm size significantly influence financing decisions. State-owned construction companies, such as PT Pembangunan Perumahan (Persero) and PT Wijaya Karya (Persero) Tbk, exemplify the nuanced decision-

making required. PT PP, facing financial pressures during the pandemic, favored term debt securities over new shares, while PT Waskita Karya's high debt ratio necessitated global bond issuance and debt restructuring, illustrating the delicate balance required for sustainable growth.

Against this backdrop, this study investigates factors influencing the capital structure of Indonesian construction firms. Variables considered include profitability, growth, non-debt tax shields, asset tangibility, firm age, and firm size. Prior research reveals diverse relationships between these variables and leverage: profitability showed positive correlations in Chinese and Nigerian construction companies (Yang & Li, 2018; Olawal & Shuaib, 2017); growth was positively related to leverage in Chinese and Taiwanese firms but not significant in Pakistan (Cheng & Lee, 2017; Lin & Yeh, 2018; Bakir & Tufail, 2019). Non-debt tax shields exhibited mixed effects in Indonesia (Anggita & Fauzi, 2018; Aziz & Kurniawan, 2017), while asset tangibility, firm age, and firm size produced varying relationships across countries and contexts (Chen & Chang, 2012; Sari et al., 2018; Alshubiri et al., 2021; Yusuf et al., 2021).

Given these mixed findings, this study aims to provide a rigorous analysis of the determinants of capital structure in the Indonesian construction sector. By examining financial and annual reports of infrastructure and real estate companies listed on the Indonesia Stock Exchange (IDX) from 2013 to 2022, this research seeks to identify key drivers of leverage and offer insights to guide construction firms in optimizing financial strategies for sustainable growth. Subsequent sections outline the methodology, present the findings, and discuss theoretical and practical implications for financial management in Indonesia's construction industry.

## **Literature Study**

### *Capital Structure Theories*

Financial management is a crucial aspect of corporate governance, focusing on generating funds to support a company's investments through a combination of debt and equity. The capital structure, defined as the mix of debt and equity used by a company, plays a key role in determining its financial position and overall value (Brigham & Houston, 2010). Various capital structure theories provide frameworks to understand how firms make decisions regarding their financial structure, including the trade-off theory, pecking order theory, and agency theory.

**Trade-off Theory** – Modigliani and Miller (1958) proposed that firms seek an optimal capital structure by balancing the tax benefits of debt with the costs of financial distress. According to this theory, a company should use debt up to the point where the tax advantages are equal to the expected costs of financial distress, taking into account factors such as cash flows, assets, and growth opportunities.

**Pecking Order Theory** – Developed by Myers (1984), this theory suggests that firms prioritize internal financing, then debt, and only issue equity as a last resort. External financing may signal negative information to investors, potentially raising the cost of capital.

**Agency Theory** – Introduced by Jensen (1986), agency theory emphasizes conflicts of interest among stakeholders, including shareholders, managers, and debt holders. Effective capital structure management is necessary to minimize agency conflicts and align stakeholder interests, as shareholders may prefer riskier investments while debt holders prioritize lower-risk options.

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*Profitability and Capital Structure (H1)*

Profitability reflects a company's ability to generate earnings, while capital structure represents the ratio of debt to equity used to finance operations (Brealey, Myers & Allen, 2017). According to the pecking order theory (Myers, 1984), a negative correlation exists between profitability and capital structure because firms with higher profits are less reliant on external debt. This view is supported by Nhung & Okuda (2015) and Hamid et al. (2015), who found negative correlations between profitability measures (e.g., return on assets, return on equity) and debt levels.

Hypothesis 1 (H1): Profitability has a negative influence on firm capital structure.

*Growth and Capital Structure (H2)*

Growth is the rate at which a company's assets, sales, and earnings increase. Firms with higher growth often require additional financing to support expansion, which can influence capital structure (Brealey, Myers & Allen, 2017). Rajan & Zingales (1995) and Cheng & Lee (2017) found that firms with higher growth rates tend to have higher debt-to-equity ratios, indicating that expanding firms rely on external funding to facilitate growth strategies.

Hypothesis 2 (H2): Firm growth has a positive influence on capital structure.

*Non-Debt Tax Shields and Capital Structure (H3)*

A non-debt tax shield is a reduction in taxable income through allowable deductions, such as depreciation, which reduces reliance on debt for tax benefits. According to Frank & Goyal (2009) and Rajan & Zingales (1995), non-debt tax shields negatively influence capital structure, as firms with higher non-debt tax shields are less likely to use debt financing.

Hypothesis 3 (H3): Non-debt tax shields have a negative influence on capital structure.

*Asset Tangibility and Capital Structure (H4)*

Asset tangibility measures the extent to which a company's assets can be easily converted into cash in the event of bankruptcy. Rajan & Zingales (1995) and Degryse, Dewaele & Van (2010) found a negative relationship between asset tangibility and capital structure. Firms with more tangible assets may rely less on debt because these assets can serve as collateral or attract equity investors.

Hypothesis 4 (H4): Asset tangibility has a negative influence on capital structure.

*Simultaneous Influence of Factors (H5)*

Capital structure is influenced by multiple interrelated factors, including profitability, growth, non-debt tax shields, and asset tangibility. This study examines the combined effects of these variables to understand how they collectively shape leverage decisions in construction companies.

Hypothesis 5 (H5): Profitability, growth, non-debt tax shields, and asset tangibility simultaneously influence capital structure.

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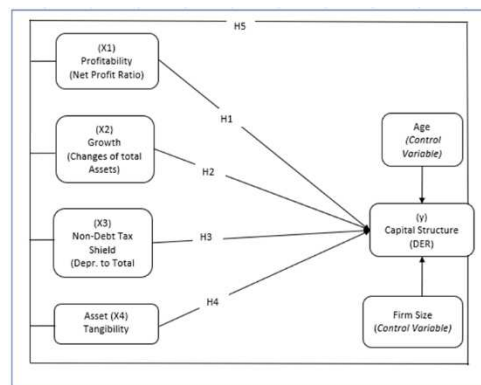


Figure 1.  
Conceptual framework

Figure 1 above illustrates the conceptual framework and the hypothesized relationships between the independent variables (profitability, growth, non-debt tax shields, and asset tangibility) and the dependent variable (capital structure).

## Research Methodology

### Sampling

This study's data sample 93 property and real estate companies' sector and 67 infrastructure companies' sectors with the populations are firms listed in Indonesia Stock Exchange from 2013 to 2022. The firms' information is found from the IDX website and the data for each firm are taken from the financial reports found in each firm's website. The researcher used nonprobability sampling method, in which the researcher selects smaller samples from a larger population with selected criteria. The firms listed in the Indonesian stock exchange are the population, while the 21 firms chosen as the samples.

### Operational Definitions of Variables

Table 1.  
Operational Definition Table

| Variable                    | Operational Definition                                                                                                                                                                                                                                                          | Formula                    | Measuring Scale |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|-----------------|
| Dependent Variables         |                                                                                                                                                                                                                                                                                 |                            |                 |
| Capital Structure ( $Y_1$ ) | Capital structure is the way in which a company finances its operations and growth through the use of different sources of funding, such as debt and equity. Measured with DER, which compares the total debt to the equity owned by the firm itself (Hanafi & Halim, A, 2018). | Total debts / Total equity | Ratio           |

| Independent Variables         |                                                                                                                                                                                                                                                                                                               |                                                                                |       |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|-------|
| Profitability ( $X_1$ )       | Profitability of an enterprise's ability to make a profit in a certain period. To measure the level of profitability in this measurement, an ROA (Return on Asset) ratio is used.                                                                                                                             | Net income / Total assets                                                      | Ratio |
| Growth ( $X_2$ )              | Firms with high growth opportunities may be willing to take on more debt to finance growth, but only up to a point where the costs of financial distress outweigh the benefits. (Hovakimian, Opler & Titman, 2001)                                                                                            | $(\text{Total asset}_t - \text{Total asset}_{t-1}) / \text{Total asset}_{t-1}$ | Ratio |
| Non-Debt Tax Shield ( $X_3$ ) | Since taxes reduce the present value of cash flows, a firm can increase its value by reducing its tax liability using non-debt tax shields (Miller M. H., 1977)                                                                                                                                               | Depreciation Expenses / Total assets                                           | Ratio |
| Asset tangibility ( $X_4$ )   | Firms with more tangible assets have higher leverage ratios, and that this effect is stronger in industries where asset tangibility is more important (Rajan & Zingales, L., 1995)                                                                                                                            | Fixed Assets / Total Assets                                                    | Ratio |
| Control Variable              |                                                                                                                                                                                                                                                                                                               |                                                                                |       |
| Age of Firm                   | These factors contribute to older firms being more profitable due to their established operational strategies for producing goods and services to meet various customer demands. However, (Graham, Li, S & Qiu, 2011) suggest that young firms may experience distress during a negative stock market period. | Research Date – Date of Company's                                              | Ratio |
| Size of Firm                  | The total assets, total sales, market capitalization, and other factors can all be used to calculate the company size. Larger firms tend to perform more diversification and have lower default risk than smaller firms. (Köksal & Orman, C, 2014)                                                            | In Sales Revenue                                                               | Ratio |

## Data Analysis Method

### *Descriptive Statistical Analysis*

Descriptive statistics are used to organize and summarize data by describing the connection between the variables in a sample or population. Prior to computing descriptive statistics, which

is a crucial first step in doing research, inferential statistical comparisons should never be made. Descriptive statistics also incorporate categories of variables (nominal, ordinal, interval, and ratio) in addition to measures of frequency, central tendency, dispersion/variation, and location (Creswell, 2017).

#### *Regression Model for Panel Data*

There exist three procedures in assessing regression model with panel data. These approaches are common effect, fixed effect, and random effect. This test is conducted to find the best method for the panel data regression model to hypothesis testing. STATA is used in testing the regression model.

#### *Chow Test*

Chow test is a test to evaluate if this data should follow the common effect or fixed effect approach. In the Chow test, the common effect method will be chosen if the results show that p-value is higher than 0.05. If the p-value is lower than 0.05, fixed effect method will be chosen.

#### *Hausman Test*

The Hausman test is conducted whether the fixed effect approach or the random effect approach to be selected. The fixed effect approach will be chosen if the probability is less than 0.05, while the random effect approach will be chosen if the probability is more than 0.05.

#### *Multiple Regression Analysis*

Regression analysis is in determining the influence of the independent variable on the dependent variable. Multiple linear regression is used in this research to analyse the data as it is used to find out multiple independent variables affect the dependent variable with the measuring or ratio scale in a linear equation. The multiple linear regression models can be seen as follows:

$$DER = a + \beta_1ROA + \beta_2Growth + \beta_3NDTS + \beta_4AT + \beta_5Size + \beta_6AGE + \varepsilon$$

### **Hypothesis Testing**

#### *T Statistics Testing*

T Statistics Test or known as Partial Significance Test is utilized to examine if the independent variable on its own has a significant influence on the dependent variable or not. The independent variable has a significant effect if the T-test probability value is less than 0.05. The null hypothesis ( $H_0$ ) is that independent variable does not have a significant effect on the dependent variable and the alternative hypothesis is vice versa (Ghozali, 2013).

#### *F Testing*

It can be said that the null hypothesis ( $H_0$ ) is that independent variables simultaneously does not have a significant impact on the dependent variable and the alternative hypothesis is vice versa. Gujarati (2012) stated the formula for the F-test below and the hypothesis of the F-test in this research can be explained as  $H_0$  is accepted if probability F-statistics > 0.05 then there is no simultaneous significant impact of the independent variables towards the dependent variables.

#### *Coefficient of Determination Testing*

The  $R^2$  test measures the significance of the effect independent variables have on the dependent variables. The coefficient of correlation (R) can be defined as the link between two or more

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independent variables to the dependent variable on a scale from 0 to 1. There is stronger relationship when the R value is closer to 1 (Ghozali, 2013).

## Research Results and Discussions

### *Multiple Regression Analysis*

Following the results of Chow tests and Hausman tests, the multiple regression tests for DER use fixed effect approach as the fixed effect approach is the most accurate in this research. Table 2 below display the results from the analysis:

Table 2.  
Multiple Regression Analysis Results for DER

| Variables | Coefficient | Std. Error | t-Statistic | Prob. |
|-----------|-------------|------------|-------------|-------|
| C         | 1.3387      | 0.2559     | 5.23        | 0.001 |
| ROA       | -6.9610     | 0.6254     | -11.13      | 0.000 |
| Growth    | 0.5491      | 0.2326     | 2.36        | 0.046 |
| NDTS      | -4.2789     | 5.2970     | -0.81       | 0.443 |
| AT        | -0.2689     | 0.0603     | -4.46       | 0.002 |

Source: Data processed with STATA

$$\text{DER} = 1.3387 - 6.9610 \text{ ROA} + 0.5491 \text{ Growth} - 4.2789 \text{ NDTS} - 0.2689 \text{ AT}$$

## Hypothesis Testing

### *T Statistics Testing*

The significance value of  $\alpha = 0.05$  will be compared to the T-test value of probability of every independent variable. The results from Table 2 show that risk, non-debt tax shield, and liquidity have a significant influence toward capital structure, with the t-test values of probability of 0.0000, 0.0460, and 0.0020 respectively.

$$\text{DER} = 1.3387 + 0.0000 \text{ ROA} + 0.0460 \text{ Growth} + 0.0020 \text{ AT}$$

The results from the T Statistics Testing compared with the hypotheses:

1. The T-test value of probability for independent variable ROA on dependent variable capital structure is 0.0000. ROA has a probability value less than 0.05 and thus the null hypothesis is rejected. With the t-statistic value of -11.13, this means that ROA has a significant and negative influence on capital structure.
2. The T-test value of probability for independent variable growth on dependent variable capital structure is 0.0046. growth has a probability value less than 0.05 and thus the null hypothesis is rejected. With the t-statistic value of 2.36, this means that growth has a significant and positive influence on capital structure.
3. The T-test value of probability for independent variable non-debt tax shield on dependent variable capital structure is 0.4430. non-debt tax shield has a probability value more than 0.05 and thus the null hypothesis is accepted. With the t-statistic value of -0.81, this means that non-debt tax shield has an insignificant and negative influence on capital structure.
4. The T-test value of probability for independent variable asset tangibility on dependent variable capital structure is 0.0020. asset tangibility has a probability value less than 0.05 and thus the null hypothesis is rejected.
5. With the t-statistic value of -4.46, this means that asset tangibility has a significant and negative influence on capital structure.
6. The T-test result for dependent variable capital structure is that ROA, growth, and asset

tangibility have significant influence on capital structure but non-debt tax shield have insignificant influence on capital structure.

### *F-Testing*

The F-test result can be seen by looking at the probability value compared the significant value of 0.05. The alternative hypothesis is accepted if the independent variables at the same time will have significant influence on the dependent variable if the probability value is under 0.05 and vice versa the null hypothesis is accepted if the independent variables at the same time won't have significant influence on the dependent variable if the probability value is more than 0.05.

Table 3.  
F Testing Results.

|                   | DER    |
|-------------------|--------|
| F-Statistic       | 174.29 |
| Prob(F-Statistic) | 0.0000 |

Source: Data Processed with STATA

Based on Table 3 above, the probability value of F-test for DER is 0.000. The capital structure of Indonesian construction firms is significantly influenced by determinants including profitability, growth, non-debt tax shield and asset tangibility.

### *Coefficient of Determination Testing*

The capacity of independent variables in influencing the dependent variable can be seen with R-squared value (Baltagi, 2008). Coefficient of determination assesses the capacity of the model in explaining the independent variables.

Table 4.  
Coefficient of Determination Results

|                    | DER    |
|--------------------|--------|
| R-squared          | 0.4007 |
| Adjusted R-squared | 0.3956 |

Source: Data Processed with STATA

The results shown that the adjusted R-squared value for DER is 0.4007, this indicates that the independent variables have simultaneous influence of 39.56% on capital structure. The adjusted R-squared value is close to 1, which means that capital structure has a very strong correlation with the independent variables. Other factors outside of this research affected 60.44% of capital structure.

## **Conclusion and Implications**

This study investigates the influence of selected determinants—profitability, growth, non-debt tax shields, and asset tangibility—on the capital structure of construction firms listed on the Indonesia Stock Exchange between 2013 and 2022.

Using STATA for data analysis, the study finds that:

- Growth has a significant and positive influence on capital structure, indicating that firms experiencing higher growth tend to use more debt to finance expansion.

- Profitability and asset tangibility exhibit a significant negative influence on capital structure, suggesting that more profitable firms and those with greater tangible assets rely less on debt financing.
  - Non-debt tax shields show an insignificant effect on capital structure in the sampled firms.
- Collectively, the four determinants have a significant simultaneous influence on capital structure, with an adjusted coefficient of determination ( $R^2$ ) of 39.56%. This implies that while these variables explain a substantial portion of the variation in capital structure, approximately 60.44% of the variation is attributable to other factors not included in this model.

### *Implications*

1. For practitioners, the findings provide practical guidance in designing financing strategies and optimizing the debt-equity mix. Understanding the effects of growth, profitability, and asset tangibility can help managers make informed decisions about leveraging debt while maintaining financial stability.
2. For academics, this research contributes to the literature on capital structure in emerging markets, particularly the Indonesian construction sector, highlighting the nuanced relationships between key financial determinants and leverage.

### *Limitations and Future Research*

This study is limited to construction firms, and findings may not be generalizable to other industries. Future research could expand to other sectors, incorporate additional determinants, and explore longitudinal impacts of these variables to provide a more comprehensive understanding of firms' financing strategies.

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